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ILLUSTRATED FLOW CHART TO CERTAIN GROUPS OF CHIRONOMID LARVAE

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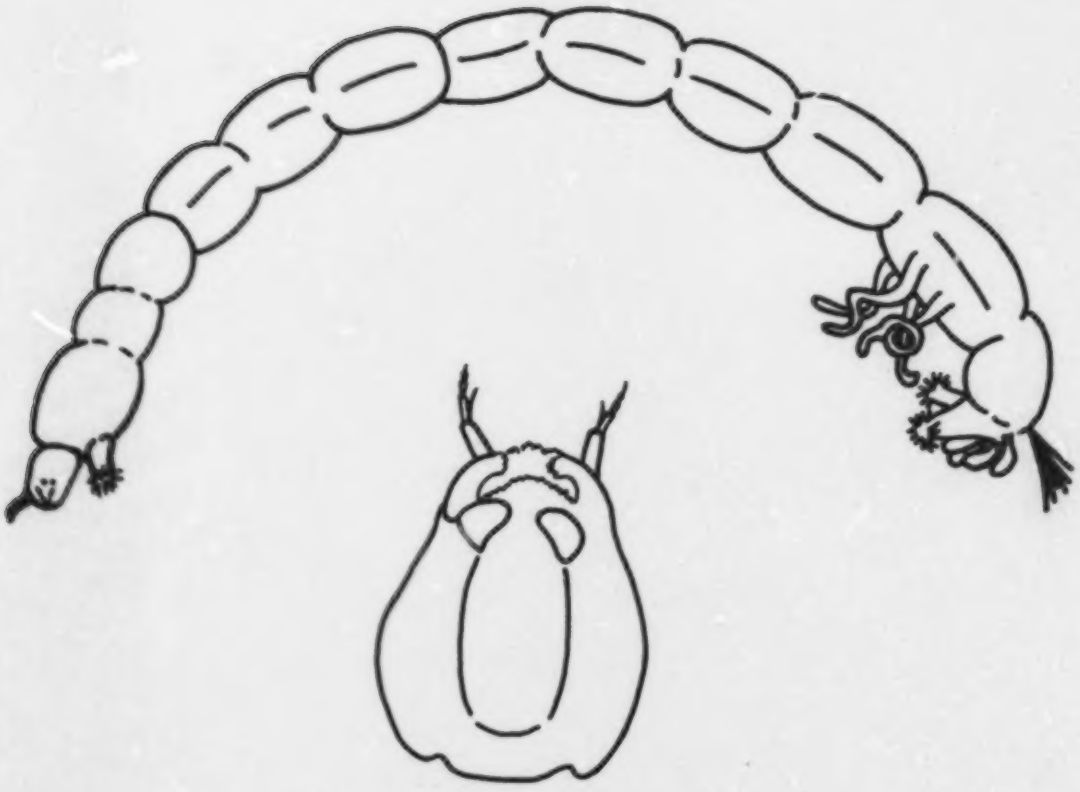
Chironomid Larvae

Flow Chart



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ILLUSTRATED FLOW CHART TO CERTAIN GROUPS OF CHIRONOMID LARVAE

by

GEORGE H. PAINE, Jr.

The following illustrated flow chart is intended to facilitate identification of some common genera and species of Chironomid larvæ of North America. Some brief remarks on the morphology and physiology of the family may be of assistance before using the chart.

The larva is most frequently aquatic and resembles a geometrid moth caterpillar in form and appearance. Although the larva may be white, green, yellow, blue-green, or mottled, (usually according to species) the red or reddish-orange ones are most familiar (though not necessarily the most common). This striking red color has led to the common name of bloodworms for all the larvæ. The presence of erythrocruorin in the blood (usually referred to as hæmoglobin) causes the red color in this family and in some other invertebrates. The larva is composed of a head and usually twelve body segments, the first three segments form the thorax, the rest the abdomen. The "legs" are called prolegs -- the fore pair being on the prothorax (first thoracic segment) and the hind pair (when present) are on the terminal or anal segment of the body. The thoracic segments are somewhat swollen just before pupation to accommodate the developing cephalo-thorax of the pupa. The terminal segment also bears a pair of preanal papillæ provided with sensory bristles at each tip (connected with the nervous system), and two to six anal "gills". In some groups one or all of these terminal organs may be wanting. In some species of *Hydrobaenus*, *Glyptotendipes*, and *Chironomus*, there are one or two pairs of so-called gills borne ventrally on the penultimate segment. These are the ventral gills of taxonomic descriptions. The anal "gills" are not gills in respiratory sense, but extractors mostly concerned with the intake of Cl^-. The ventral gills are believed to function during anaerobiosis and low pO_2, secreting lactic acid. The anal or terminal segment is often darker than other segments in preserved specimens because of the presence of the heart and its blood sinuses.

Some of these species are actively favored by pollution and their presence, especially in the absence of intolerant forms may be taken as a strong indication of the presence of organic pollution. Other Chironomids conversely are highly intolerant of pollution, and a diagnosis of "pollution" based solely on their presence as "Chironomid larvæ", would be a gross error. The importance of generic and (in many cases) species identification in interpreting the pollutional significance of this group is thus self-evident.

A study of figures 1 and 2 is advised before using the flow chart.

Acknowledgments:

This chart would be impossible without the encouragement and suggestions of C. M. Tarzwell, Chief of the Biology Section and A. R. Gaufin of the University of Utah. Especial thanks are due Lucile A. Williams and Jack Davis for their care and work in vari-typing and illustrating.

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By

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II

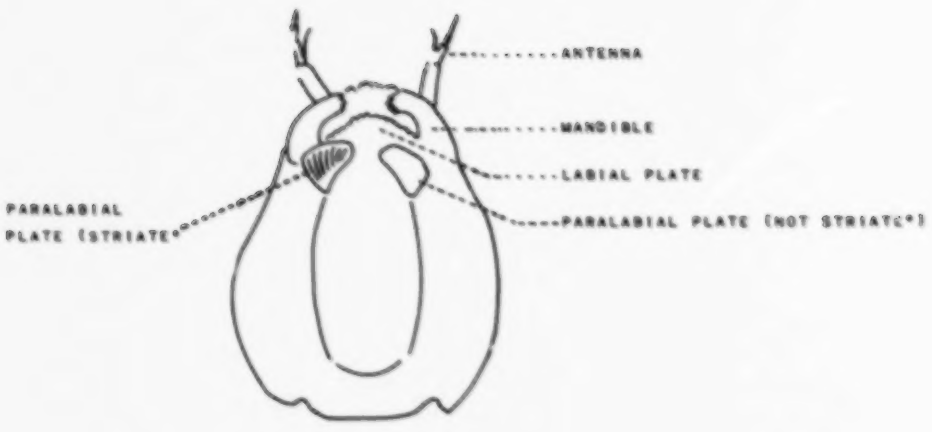

FIGURE 2

VENTRAL VIEW OF
A CHIRONOMID HEAD
(SEMI-DIAGRAMMATIC)

*P ALABIAL PLATES WHEN PRESENT ARE STRIATE IN MORE SPECIES THAN NOT STRIATE. THE FIGURE COMPARES THE TERMS BUT DOES NOT REPRESENT A STATE EVER FOUND IN ANY SPECIES.

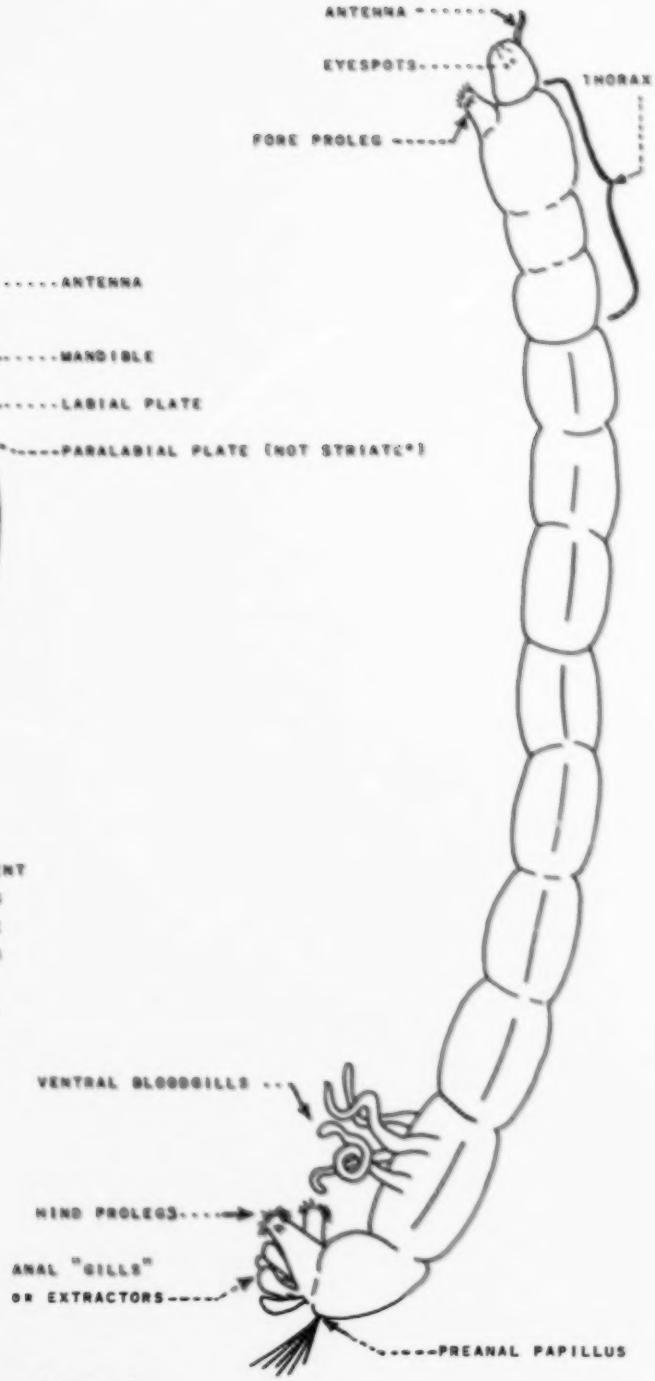

FIGURE 1

CHIRONOMID LARVA WITH SOME TAXONOMIC FEATURES INDICATED.

Flow Chart To Chironomidae

LARVA BEARS BOTH FORE AND REAR PROLEGS EACH BEARING CLAWS OR, IF REAR PAIR ARE REPRESENTED BY A FEW CLAWS OR ARE WHOLLY LACKING. THE FORE PROLEGS ARE REPRESENTED BY 1 or 2 PATCHES OF SPINULES ON VENTRAL SIDE OF THORAX.

FIG. 3

LARVA LACKS HIND PROLEGS. FORE PROLEGS REDUCED TO PATCHES OF SPINULES; TERRESTRIAL = SMITTIA

LARVA BEARS BOTH FORE AND HIND PROLEGS (FIG. 1)

VENTRAL BLOODGILLS BORNE ON PENULTIMATE SEGMENT. (FIG. 1)

VENTRAL BLOODGILLS LACKING.

PAGE 3

FIG. 4

1 PAIR OF SHORT VENTRAL BLOODGILLS = GLYPTOTENDIPES LC.31 (= G. LOBIFERUS OF MALLOCH)

2 PAIRS OF LONG VENTRAL BLOODGILLS

FIG. 5

MANDIBLE BEARS 3 BLACK VENTRAD TEETH AND 1 BROWN OR PALE TOOTH ON SAME SIDE

FIG. 6

MANDIBLE BEARS 4 BLACK VENTRAD TEETH INCLUDING APEX.

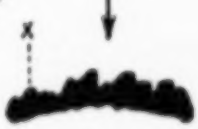

FIG. 7

FIG. 8

FIG. 9

MIDDLE LABIAL TOOTH SCARCELY BUT OBVIOUSLY TRIPARTITE. LAKES AND RIVERS.

CHIRONOMUS PLUMOSUS AND CHIRONOMUS TENTANS

MIDDLE LABIAL TOOTH SHARPLY TRIPARTITE. OFTEN IN SEWAGE.

= CHIRONOMUS RIPARIUS

5TH PAIR OF LATERAL LABIAL TEETH SUBEQUAL TO 4TH PAIR, NOT EXCEEDING.

= CHIRONOMUS DECORUS

5TH PAIR OF LATERAL LABIAL TEETH EXCEED ADJACENTS (FIG. 7, X)

= CHIRONOMUS ANTHRACINUS

VENTRAL BLOODGILLS LACKING

BODY LONG AND EXCEEDINGLY SLENDER WITH CONSPICUOUS SWOLLEN DEPRESSED THORAX; ANAL GILLS LONG, CONSTRICTED IN THE MIDDLE. (FIG. 10)

(NEW YORK AND SAVANNAH RIVER)

= CRYPTOCHIRONOMUS SENS. LAT.

LARVA - JOHANNSEN: B

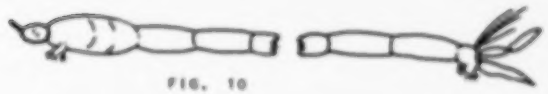

FIG. 10

BODY MORE "TYPICAL" AS FIG. 9

NO MORE THAN 4 ANAL GILLS PRESENT

8 ANAL BLOODGILLS (cf FIG. 9) PRESENT

= PELOPIA [TANYPUS]

FIG. 11

FIG. 14

2 EYESPOTS ON EACH SIDE OF HEAD, 1 IN FRONT OF THE OTHER, FORE SPOT USUALLY MUCH THE SMALLER.

FIG. 12

1 SINGLE EYESPOT (FIG. 12) ON EACH SIDE OF HEAD, PREANAL PAPILLAE (P, FIG. 13) RELATIVELY LONG.

(PAGE 4)

2 EYESPOTS ON EACH SIDE OF HEAD, ONE ABOVE THE OTHER.

SUB FAMILY CHIRONOMINAE

(SEE PAGE 8)

FIG. 13

FIG. 15

ANTENNAE RELATIVELY LONG FOR HEAD, 3rd ANTENNAL SEGMENT GENICULATE AND DARK. NOT OVER 5 mm LONG. IN ALGAL MASSES

= CORYNONEURA

ANTENNAE RELATIVELY SHORT (cf FIGS. 14 & 15) USUALLY IN ALGAL MASSES.

BRISTLE PENCILS LACKING

FIG. 16

BRISTLE - PENCILS BORNE ON CAUDO - LATERAL MARGINS OF INTERMEDIATE ABDOMINAL SEGMENTS:

CRICOTOPUS (IN PART)

LONG, BLACK BRISTLES OCCURRING SPARSELY ON ABDOMINAL SEGMENTS;

HYDROBAENUS (IN PART)

BRISTLES IF PRESENT NOT EVIDENT:

SUBFAMILIES: DIAMESINAE AND HYDROBAENINAE

Flow Chart

1 SINGLE EYESPOT ON EACH SIDE OF HEAD (cp. FIG. 12);
PREANAL PAPILLAE RELATIVELY LONG

FIG. 17

FIG. 24

FORE PROLEGS NOT AS LONG AS PENTANEURA (cp. FIG. 24);
VENTRAL PAIR OF ANAL GILLS ON BASE OF HIND PROLEGS.

FORE PROLEGS LONG AND STILTLIKE, ANAL GILLS ALL CLOSE TO ANUS;
(PENTANEURA)

ANAL GILLS SLIGHTLY CONSTRICTED NEAR MIDDLE AND LONG AND SLENDER.
METRIOCNEMUS LUNDBECKI

ABDOMEN BEARS A LATERAL BRISTLE-FRINGE (FIG. 19) OR SCATTERED LONG BRISTLES (FIG. 18)

LONG BRISTLES LACKING EXCEPT ON PREANAL PAPILLAE

FIG. 23

ONE OR MORE CLAWS ON HIND PROLEG DARK BROWN.

ALL CLAWS OF HIND PROLEGS YELLOW.

LIVING LARVA WHITE to YELLOWISH:
PENTANEURA FLAVIFRONS

2 CLAWS DARK BROWN.
P. MONILIS

3 CLAWS DARK BROWN.
P. MALLOCHI

ANAL GILLS NOT CONSTRICTED

FIG. 18

BRISTLES LONG, SCATTERED, NOT CONFINED TO A LATERAL FRINGE:
PROCLADIUS

FIG. 22

ANTENNAL LENGTH GREATER THAN ITS DIAMETER, BASAL SEGMENT SLIGHTLY BUT DISTINCTLY BENT
= BRILLIA

FIG. 25

ANTENNA VERY SHORT WIDTH SUBEQUAL TO LENGTH
= METRIOCNEMUS FUSCIPES

LIVING LARVA GREEN to GREENISH, LONG, SCATTERED BRISTLES ON BODY SEGMENTS:
P. MELANOPS

FIG. 19

BRISTLE-FRINGE AT 45° ANGLE NOT APPRESSED:
(FIG. 19)
ANATOPYNIA DYARI

BRISTLES IN DEFINITE LATERAL LONGITUDINAL ABDOMINAL FRINGE

BRISTLE FRINGE CLOSELY APPRESSED TO BODY

FIG. 21

BRISTLE-PENCILS LACKING;
CLINOTANYPUS

FIG. 20

FORE-LATERAL ANGLES OF ABD. SEGMENTS BEAR A BRISTLE-PENCIL;
(FIG. 20, B-P)=
COELOTANYPUS

Chironomidae

2 EYESPOTS ON EACH SIDE OF HEAD, ONE ABOVE THE OTHER (FIG. 11)

FIG. 26

BOTH HEAD AND BODY SLENDER. ANAL GILLS CONSTRICTED AND SHARPLY TAPERING OR NOT CONSTRICTED NOR TAPERING. (See FIGS. 27, 28, 29)

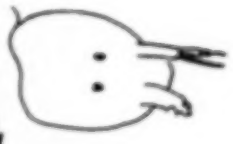

FIG. 30

HEAD USUALLY BLUNT OR SOMEWHAT ROUNDED. ANAL GILLS MAY BE CONSTRICTED. (PAGE 6)

FIG. 28

FIG. 27

ANAL GILLS MAY BE CONSTRICTED BUT NOT SHARPLY TAPERING, OFTEN RATHER LONG. See FIG. 28

ANAL GILLS NOT CONSTRICTED. = KRIIDOXENUS

ALL TEETH OF LABIAL PLATE SIMPLE, NEARLY UNIFORM = POLYPEDILUM FALLAX

FIG. 31

MIDDLE LABIAL TEETH PROJECT BEYOND LATERALS. = POLYPEDILUM LC-15

FIG. 29

ANAL GILLS NEITHER CONSTRICTED NOR SHARPLY TAPERING. LABIAL PLATE WITH LARGE TOOTHLESS MIDDLE AREA. = CRYPTOCHIRONOMUS

ANAL GILLS CONSTRICTED BEYOND THE MIDDLE, NIPPLE-LIKE, SHARPLY TAPERING TO THE TIP, USUALLY IN FAST WATER. (POLYPEDILUM)

LIVE LARVA GREEN OR GREENISH

LIVE LARVA RED OR ORANGE-RED = POLYPEDILUM ILLINOENSE

EYESPOTS DEFINITELY (FIG. 26) CONTIGUOUS. ALL LABIAL TEETH DARK. = POLYPEDILUM CONVICTUM

EYESPOTS NEARLY CONTIGUOUS, MIDDLE LABIAL TEETH SLIGHTLY SHORTER AND PALER THAN LATERALS. = POLYPEDILUM BRASENIAE

Chironomidae

HEAD USUALLY BLUNT OR SOMEWHAT ROUNDED, ANAL GILLS MAY BE CONSTRICTED AND GRADUALLY TAPERING (FIG. 30)

EYESPOTS WELL SEPARATED, ANAL GILLS NOT CONSTRICTED (FIG.) ANTENNAE 5-SEGMENTED.

SEE FIG. 32 ANTENNAE MOUNTED ON PROMINENCES, BASAL SEGMENT ELONGATE AND SLIGHTLY CURVED. (CALOPSECTRA)

FIG. 36

HEAD RELATIVELY SMALL, ANAL GILLS CONSTRICTED AND GRADUALLY TAPERING (FIG. 36) CLEAN SANDY BOTTOMS. = STICTOCHIRONOMUS VARIUS

EYESPOTS CONTIGUOUS OR BUT SLIGHTLY SEPARATED ON ONE SIDE. (FIG. 11) ANTENNAE 6 – SEGMENTED.

FIG. 37

HEAD SIZE TYPICAL OF CHIRONOMINAE. ANAL GILLS NOT CONSTRICTED BUT CURVED DORSAD. = MICROTENDIPES

ANTENNAE NOT MOUNTED ON PROMINENCES (CF. FIGS. 30 & 32)

FIG. 38

PRECRANAL PAPILLAE SHORT. (FIG. 38, P) (SEE PAGE 7)

HEAD WITHOUT POSTERIOR TUBERCLES (FIG. 33)

FIG. 39

PRECRANAL PAPILLAE RELATIVELY LONG (FIG. 39, P) = PSEUDOCHIRONOMUS

FIG. 33

HEAD BEARS TUBERCLES POSTERIORLY; VERY SMALL (SUBGENUS STEMPELLINA) (CALOPSECTRA JOHANNSENI)

FIG. 34

LAUTERBORN ORGANS (FIG. 34, L) OF ANTENNA PLACED ALTERNATELY AT TIPS OF 2ND AND 3RD SEGMENTS. SAVANNAH RIVER. = SUBGENUS ZAVRELIA.

LAUTERBORN ORGANS OF ANTENNA (SEE FIG. 34) PLACED OPPOSITE EACH OTHER AT TIP OF 2ND SEGMENT.

FIG. 35

MIDDLE LABIAL TOOTH SIMPLE. DORSAL HUMP ON PENULTIMATE SEGMENT STRONGLY DEVELOPED (FIG. 35) = CALOPSECTRA DIVES

MIDDLE LABIAL TOOTH TRILOBED. DORSAL HUMP ON PENULTIMATE SEGMENT NEVER STRONGLY DEVELOPED. LYTLE CREEK, OHIO = CALOPSECTRA LC-7

LAUTERBORN ORGANS (FIG. 34, L) LONG AND FILAMENTOUS, AT LEAST THREE TIMES LENGTH OF LAST 3 ANTENNAL SEGMENTS COMBINED. (SUBGENUS MICROPSECTRA)

LAUTERBORN ORGANS NOT LONGER THAN COMBINED LENGTH OF LAST 3 ANTENNAL SEGMENTS (FIG. 34, L) (SUBGENUS CALOPSECTRA)

Chironomidae

PREANAL PAPILLAE SHORT (FIG. 38) (PAGE 6)

FIG. 40

ANTENNA 5-SEGMENTED

FIG. 45

ANTENNA 6-SEGMENTED

FIG. 41

EYESPOTS UNUSUALLY LARGE BUT DISTINCTLY SEPARATED (FIG. 41) = TANYTARSUS [SCHOENTIA]

FIG. 42

EYESPOTS NOT OVERLARGE BUT WELL SEPARATED AND OFTEN WITH A FLECK OF PIGMENT BETWEEN.

FIG. 46

LABIAL PLATE BEARS 1 OR MORE PALE MIDDLE TEETH

FIG. 43

MIDDLE OF LABIAL PLATE EMARGINATE, NOT TOOTHED (FIG. 43) = ENDOCHIRONOMUS QUADRIPUNCTATUS.

MIDDLE OF LABIAL PLATE WELL TOOTHED. (PAGE 8)

FIG. 44

MIDDLE OF LABIAL PLATE A BROAD TOOTHLESS SECTION FLANKED BY OBLIQUELY PLACED RODS OF LATERAL TEETH.

= CRYPTOCHIRONOMUS

1 MIDDLE LABIAL TOOTH PALE.

= APEDILUM NIGROHALTERALE

6 MIDDLE LABIAL TEETH PALE (FIG. 46 IS PARATENDIPES)

= PARATENDIPES

FIG. 47

ALL LABIAL TEETH DARK

FIG. 48

STRIATIONS ON PARALABIAL PLATES SCARCELY VISIBLE.

= STENOCHIRONOMUS TAENIAPENNIS [LABIAL PLATE, FIG. 47]

FIG. 49

STRIATIONS ON PARALABIALS DISTINCT.

= LAUTERBORNIELLA

MIDDLE OF LABIAL PLATE WELL TOOTHED

(See PAGE 7)

FIG. 50

THE MIDDLE LABIAL TEETH ALTERNATELY SMALL AND LARGE. (FIG. 50)

= ENDOCHIRODROMUS VENOLABIS

FIG. 51

LABIAL PLATE BEARS AN EVEN NUMBER OF TEETH, THE MEDIAN PAIR AND TWO LATERALS FORMING A PRONOUNCED "FOURSOME". (ENDOTHIRODROMUS)

FIG. 54

MIDDLE LABIAL TOOTH WIDER THAN LATERALS ENTIRE, OR LOBED.

MIDDLE LABIAL TOOTH TRILOBED OR NOTCHED (cp. FIG. 9, PAGE 2)

PAGE 9

LABIAL PLATE BEARS 14 TEETH.

= ENDOCHIRODROMUS QUATENDENS

LABIAL PLATE BEARS 12 TEETH

MIDDLE LABIAL TOOTH ENTIRE, OBTUSE OR ROUNDED (FIG. 56)

FIG. 53

ANTENNAL BLADE REACHES 6TH ANTENNAL SEGMENT (FIG. 53, A)

= ENDOCHIRODROMUS NIGRICANS

FIG. 52

ANTENNAL BLADE (FIG. 52, B) MUCH LONGER THAN ANTENNAL SEGMENTS 2 TO 5 COMBINED.

= ENDOCHIRODROMUS JUCUNDUS

FIG. 57

LABIAL TEETH TRUNCATE. PARALABIAL PLATES AS IN CALOPSECTRINI, OHIO & ILLINOIS.

CALOPSECTRINI LABIO-MALLOCHI B

FIG. 58

FIRST AND 2ND LATERALS MORE OR LESS FUSED

= DUBIONUS LINDOCHIRODROMUS

FIG. 55

MIDDLE LABIAL TOOTH BROADLY TRIANGULAR OR OBTUSE.

MIDDLE TOOTH BROADLY ROUNDED. LATERALS AS IN FIG. 56.

= OLIGOTENDIPES LIGITERUS

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FIG. 59

PARALABIAL PLATE FAN-SHAPED

OLIGOTENDIPES SCALIS

FIG. 60

PARALABIAL PLATES NARROW.

= CALOPSECTRINI LABIO-[illegible] A

LABIAL PLATE BEARS 11 TEETH

= PARADICHIRO ABORTIVO

LABIAL PLATE BEARS 13 TEETH

1ST AND 2ND LATERAL LABIAL TEETH FUSE

(cp. FIG. 55 & 56)

MIDDLE LABIAL TOOTH
TRILOBED OR NOTCHED

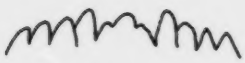

FIG. 60

MIDDLE LABIAL TOOTH
ONLY WEAKLY NOTCHED
=HARNISCHIA TENUICAUDATA
[LIMNOCHIRONOMUS TENUICAUDATUS]

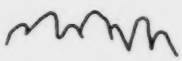

FIG. 61

MIDDLE LABIAL TOOTH
DEFINITELY TRILOBED.

LARVA VERY LONG AT MATURITY.
UP TO 2 INCHES.
5TH PAIR LATERAL LABIAL TEETH
EXCEED LAST PAIR.
=CHIRONOMUS FERRUGINEOVITTATUS
(OF MALLOCH)

LARVA AT MATURITY
ABOUT 12 MM. LONG.
SIXTH PAIR OF LATERALS
EXCEED 5TH PAIR.
LYTLE CREEK (OHIO)
=CHIRONOMUS LC-100